

# Montana Prevention Quality Indicators 2000 - 2009

# Montana Hospital Discharge Data System Office of Epidemiology and Scientific Support

**March 2011** 





### Montana Prevention Quality Indicators, 2000 - 2009

The Agency for Healthcare Research and Quality (AHRQ) is the federal agency within the US Department of Health and Human Services charged with conducting research and making recommendations to improve the quality, safety, efficiency, and effectiveness of health care in the United States. Of the four quality initiatives AHRQ developed in the 21st Century, the Prevention Quality Indicators (PQIs) and Pediatric Quality Indicators (PDIs) are the most pertinent to Public Health. AHRQ states that

"PQIs are a set of measures that can be used with hospital inpatient discharge data to identify quality of care for 'ambulatory care-sensitive conditions.' These are conditions for which good outpatient care can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease."

There are 14 PQIs evaluated in adults aged 18 years and older except as noted:

- Diabetes, short term complications
- Diabetes, long term complications
- Uncontrolled diabetes
- Lower extremity amputations among patients with diabetes
- Chronic obstructive pulmonary disease
- Adult asthma
- Bacterial pneumonia
- Hypertension
- Congestive heart failure
- Angina without procedure
- Perforated appendicitis (per 100 appendicitis admissions)
- Dehydration
- Urinary tract infections
- Low birth weight (per 100 live births)

In addition, there are five area-level PDIs evaluated in children:

- Diabetes, short term complications (ages 6 to 17 years)
- Childhood asthma (ages 2 to 17 years)
- Gastroenteritis (ages 1 to 17 years)
- Perforated appendicitis (per 100 appendicitis admissions, ages 1 to 17 years)
- Urinary tract infections (ages 1 to 17 years)

PQIs and PDIs are assessed by hospital inpatient admission rates for these conditions. The Montana Hospital Discharge Data System (MHDDS) receives annual hospital discharge data sets through a Memorandum of Agreement with the Montana Hospital Association. Most hospitals in Montana participate in voluntary reporting of discharge data from Uniform Billing Forms, version 2004 (UB-04).<sup>2</sup> The MHDDS receives



<sup>&</sup>lt;sup>1</sup> Prevention Quality Indicators Overview. AHRQ Quality Indicators. July 2004. Agency for Healthcare Research and Quality, Rockville, MD. <a href="http://www.qualityindicators.ahrq.gov/pqi">http://www.qualityindicators.ahrq.gov/pqi</a> overview.htm and <a href="http://www.qualityindicators.ahrq.gov/downloads/pqi/pqi">http://www.qualityindicators.ahrq.gov/downloads/pqi/pqi</a> guide v31.pdf

 $<sup>^2</sup>$  http://www.shepscenter.unc.edu/research\_programs/hosp\_discharge/links/ub04\_fact\_sheet.pdf

information on more than 95% of inpatient admissions in the state. Data sets are currently available for discharge years 2000 through 2009.

This report uses the AHRQ calculation algorithms<sup>3</sup> to compute hospital admission rates for the 14 indicators on a statewide basis and for the five health planning regions (Table 2 on page 11 and map on page 13). Because of small numbers of hospitalizations, data are not available for many individual counties. Please contact the MHDDS Epidemiologist to inquire about the availability of county-specific data.

#### DATA LIMITATIONS AND INTERPRETATION

Hospital discharge data sets include one primary diagnosis at admission and up to eight secondary diagnoses. The PQI and PDI computation algorithms are complex.<sup>3</sup> They may include secondary diagnoses although some admissions with a target condition included among the secondary diagnoses may be excluded from a computation if the admission is not primarily attributable to the preventable condition addressed by the PQI or PDI.

Estimated adult PQI hospitalization rates are expressed as rates per 100,000 adult population, age-adjusted to the US Standard 2000 Population age 18 years and older, except low birth weight, which is expressed per 100 live births, and perforated appendix, which is expressed per 10 appendicitis-related admissions. Estimated pediatric PDI hospitalization rates are expressed as crude rates using the appropriately aged population as a denominator. The age groups vary across the PDIs and are indicated in the footnotes to Figure 5 and Table 1.

Time trends across the decade 2000 through 2009 were assessed by fitting Poisson regression models to determine whether there had been an overall monotonic increase or decrease in rates. Because of the large number of hospitalizations for many of the indicators, nearly all time trends were statistically significant but not necessarily biologically meaningful. Decade-long changes of less than 10% were considered negligible; changes between 10% and 50% were considered modest, and changes greater than 50% were considered substantial. Most time trends were consistent with a linear model, although some displayed nonlinear fluctuations: Long-term complications of diabetes increased from 2000 through 2002, stabilized through 2006, then decreased again to levels similar to those seen in 2002. Bacterial pneumonia displayed peaks in 2002 and 2005 that may be associated with other events such as annual peaks in influenza incidence.

The statewide and regional rates tabulated in Tables 1 and 2 on pages 11 and 12 are accompanied by 95% Confidence Intervals (CI).<sup>6</sup> The 95% CI is interpreted as the numeric range within which the true rate falls with 95% certainty. The CI expresses the degree of statistical variability in the estimated rate. CIs are wide when there are small numbers of events or small base populations or both. The reliability of estimated rates based on small numbers of events can be improved by combining several years of data.

When comparing rates, it is essential to refer to the CIs. Overlapping CIs indicate a lack of statistical significance in differences between rates. In this case, the apparent difference between the rates is likely due to small numbers of events in the regions.

<sup>&</sup>lt;sup>5</sup> Fay MP, Feuer EJ. Confidence intervals for directly adjusted rates: a method based on the gamma distribution. Stat Med 16:791-801, 1997



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<sup>&</sup>lt;sup>3</sup> http://www.qualityindicators.ahrq.gov/TechnicalSpecs42.htm

<sup>&</sup>lt;sup>4</sup> Klein RJ, Schoenborn CA. Age Adjustment Using the 2000 Projected US Population Healthy People Statistical Notes no. 20, 2001 Distribution #10

<sup>5</sup> Dalgaard, P. Introductory Statistics with R, 2<sup>nd</sup> Ed, Springer, 2008

To preserve confidentiality and insure statistical reliability, rates were suppressed if there were fewer than 20 events. As a result, rates could not be calculated for many individual counties. In order to meet the 20 event threshold, indicators for the health planning regions were calculated for a three-year interval, from 2007 through 2009.

The time trends in Montana's PQI and PDI admission rates for the years 2000 through 2009 inclusive are age-adjusted to account for the general aging of the population during the decade. Comparisons between Montana and the United States as whole (Table 1, page 11) are presented as crude rates, not age-adjusted, because national age-adjusted rates were not available.<sup>8</sup>

#### TOTAL COSTS ASSOCIATED WITH POTENTIALLY PREVENTABLE HOSPITALIZATIONS

Preventive programs and early intervention could result in substantial savings for all payers.

Total charges for adult PQIs in 2009 were \$139 million; 27% of these charges were billed to private insurance carriers and 63% were billed to government programs like Medicare or Medicaid. The most expensive conditions were bacterial pneumonia (\$31.8 million), low birth weight (\$29.5 million), congestive heart failure (\$22.9 million), and chronic obstructive pulmonary disease (excluding asthma) (\$17.3 million).

Total charges for pediatric PDIs in 2009 combined were \$2.1 million, paid by private insurance (63%) or Medicaid and other publically funded programs (26%). The most expensive conditions were for perforated appendix (\$1.1 million) and asthma (\$0.8 million).



<sup>&</sup>lt;sup>7</sup> http://www.health.ny.gov/statistics/cancer/registry/age.htm

 $<sup>{8 \</sup>over http://www.qualityindicators.ahrq.gov/downloads/PQI\%20Comparative\%20Data\%202008.pdf}$ 

#### Montana Admission Rates for Adult PQIs Associated with Diabetes, 2000-2009

Short-term complications of diabetes mellitus are due to uncontrolled blood glucose caused by an imbalance of glucose and insulin. Hyperglycemia (high blood glucose) or hypoglycemia (low blood glucose) can be caused by improper diet or failure to administer insulin correctly. Both diet and insulin use are under individual control, but require patient education and compliance.

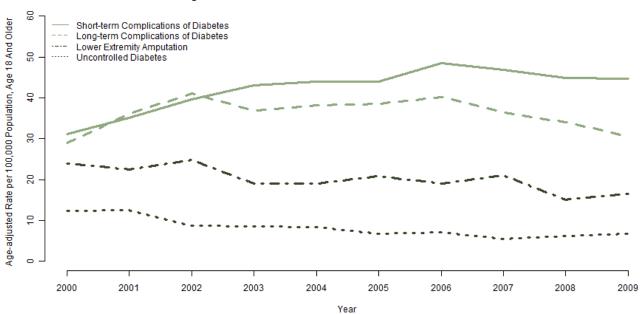
Long-term complications of diabetes mellitus include renal, ophthalmalogical, neurological, and circulatory problems. These arise from prolonged poor blood glucose control. Control begins with dietary observances and possibly insulin or other drug therapy. Reduction of long-term complications also depends on regular monitoring of hemoglobin A1C as an index of control, plus eye examinations, foot examinations, and monitoring of blood pressure.

**Uncontrolled diabetes mellitus** can exist without the mention of serious short-term or long-term complications, but strongly predicts the development of complications.

Lower extremity amputations among patients with diabetes mellitus are one of the most serious sequelae of poorly controlled diabetes. Amputations typically arise from a combination of poor peripheral circulation, loss of sensation, unnoticed and untreated injury, and necrosis or gangrene.

Montana's admission rate for short-term complications of diabetes increased modestly from 2000 through 2009. This may be explained in part by a statistically significant increase in the prevalence of diabetes in the adult population, from 4.9% (95% CI 4.0-5.8) in 2000 to 6.8% (6.2-7.4%) in 2009. The admission rate for long-term complications of diabetes fluctuated but did not show a consistent trend from 2000 to 2009. The admission rate for uncontrolled diabetes and lower extremity amputation decreased modestly throughout the decade.

Figure 1: Admission Rate For Diabetes PQIs, 2000-2009



Montana Behavioral Risk Factor Surveillance System, <a href="http://apps.nccd.cdc.gov/brfss">http://apps.nccd.cdc.gov/brfss</a>



#### Montana Admission Rates for Adult PQIs Associated with Respiratory Disease, 2000-2009

Many cases of **bacterial pneumonia** can be prevented with pneumococcal vaccination. It can be managed with early administration of antibiotics.

Chronic obstructive pulmonary disease (COPD) includes emphysema, chronic bronchitis, and asthma. Asthma is evaluated separately in the PQIs. All three conditions can be managed on an outpatient basis; management includes patient education and behavioral recommendations such as smoking cessation, evaluation and management of the home and work environments, and drug therapy.

Montana's admission rate for bacterial pneumonia fluctuated but showed no consistent trend across the decade. The peaks may be associated with peaks in other annual disease incidence rates such as influenza. The COPD admission rate declined modestly while the asthma admission rate showed no trend.

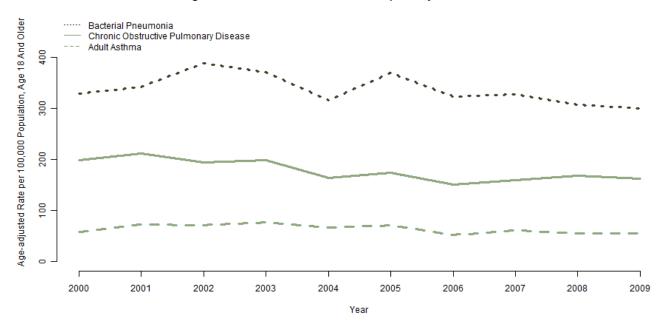


Figure 2: Admission Rates For Respiratory PQIs, 2000-2009

#### Montana Admission Rates for Adult PQIs Associated with Cardiovascular Disease, 2000-2009

**Congestive heart failure** is a progressive and usually eventually fatal chronic condition characterized by the inability of the heart to pump adequate blood volumes to the end organs. Symptoms and progression can be improved through appropriate use of medication.

**Angina without procedure** is a sign of coronary artery disease and is often a precursor of a serious event such as myocardial infarction. Management includes smoking cessation, weight loss, and treatment of hyperlipidemia, hypertension, and diabetes.

**Hypertension,** in the absence of complicating factors such as diabetes or kidney disease, is often readily controllable through diet, exercise, weight loss, and drug therapy. Hypertension itself is not often a primary cause of hospital admission but it is a major risk factor for heart attack and stroke.

Montana's admission rate for congestive heart failure declined modestly between 2000 and 2009, while the admission rate for angina without procedure declined substantially. The admission rate for hypertension did not change.

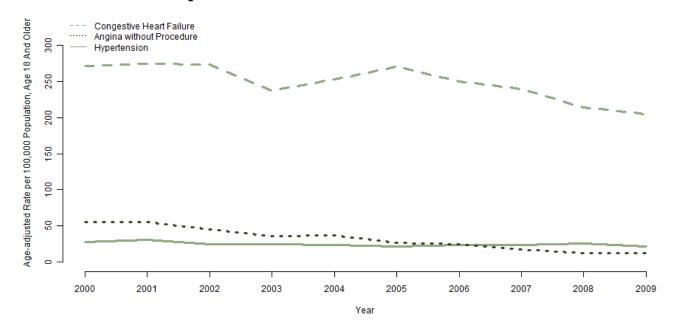


Figure 3: Admission Rates For Cardiovascular PQIs, 2000-2009



## Montana Admission Rates for Adult PQIs Associated with Other Conditions, 2000-2009

**Urinary tract infection** can be treated by early intervention with antibiotics. Left untreated, urinary tract infections can progress to more severe conditions.

**Dehydration** is a consequence of many conditions associated with reduced fluid intake or excess fluid loss. Outpatient treatment that manages causative conditions effectively, plus attention to maintaining fluid intake, can prevent dehydration. Frail and elderly adults are particularly vulnerable.

**Perforated appendix** usually occurs when treatment for acute appendicitis is delayed. Delay may occur because a patient does not seek treatment promptly or because a patient may need to be transferred for surgery. In rural Montana, distance to a hospital with surgical facilities may be an obstacle to prompt evaluation and treatment of acute appendicitis.

**Low birth weight** is a characteristic of the newborn but it reflects the management of conditions during pregnancy so it is included as an adult PQI. Early and frequent prenatal visits, managing risk factors such as maternal smoking, hypertension, gestational diabetes, drug and alcohol use, and adequate diet and appropriate weight gain help prevent low birth weight. Pregnancy among teens and women over 35 is also a risk factor for low birth weight.

None of these PQIs showed clear trends for the past decade in Montana. Admission rates for urinary tract infection and dehydration have displayed some fluctuations.

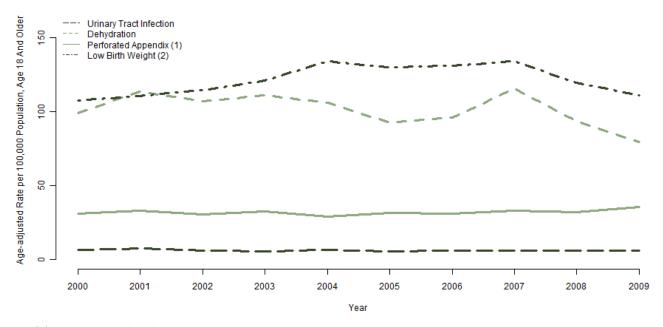


Figure 4: Admission Rates For Other PQIs, 2000-2009

- (1) Per 100 appendix admissions
- (2) Per 100 live births



#### Montana Admission Rates for Pediatric PDIs, 2000-2009

Childhood asthma management includes patient and family education, evaluation and management of the home environment such as adults not smoking in the home, and drug therapy. Compliance and selfmanagement may be more difficult for children than for adults.

Gastroenteritis is typically mild and self-limiting but if prolonged it can cause severe dehydration leading to hospitalization and, rarely, death. Gastroenteritis can be treated on an outpatient basis with oral rehydration.

Short-term complications of diabetes mellitus can become medical emergencies due to uncontrolled blood glucose caused by an imbalance of glucose and insulin. Hyperglycemia (high blood glucose) or hypoglycemia (low blood glucose) may be caused by improper diet or failure to administer insulin correctly. Both diet and insulin use are under individual control, but require patient and family education and compliance. Compliance and self-management may be more difficult for children than for adults.

Urinary tract infection can be treated by early intervention with antibiotics. Left untreated, urinary tract infections can progress to more severe conditions.

Perforated appendix usually occurs when treatment for acute appendicitis is delayed. Delay may occur because a patient does not seek treatment promptly or because a patient may need to be transferred for surgery. In rural Montana, distance to a hospital with surgical facilities may be a particular obstacle to prompt evaluation and treatment of acute appendicitis.

Admission rates for childhood asthma and short term complications of diabetes increased modestly between 2000 and 2009. Although the admission rate for gastroenteritis increased in the first half of the decade, it decreased substantially in the second half. Admission rates for urinary tract infection and perforated appendix did not change.

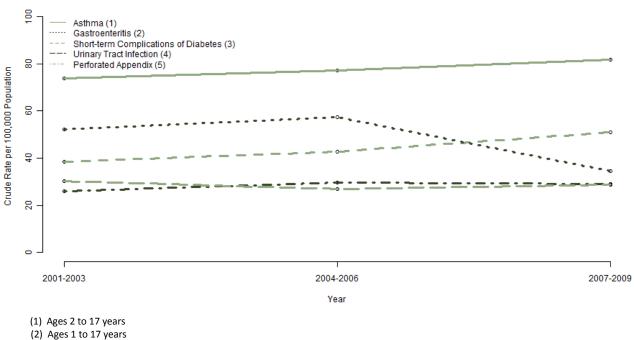


Figure 5: Admission Rates For PDIs, 2001-2009

<sup>(5)</sup> Per 100 appendix admissions, ages 1 to 17 years



<sup>(3)</sup> Ages 6 to 17 years

<sup>(4)</sup> Ages 1 to 17 years

Adult PQIs and pediatric PDIs are generally lowest in the western states due in part to a generally younger population and lower prevalence rates of the chronic diseases included in the indicators. <sup>10</sup> The adult prevalence rate of diabetes is lower in Montana than in the US as a whole but the prevalence rate of cardiovascular disease is not. <sup>11</sup>

Although most Montana indicators compare favorably to national rates (Table 1), there is still substantial room for improvement, especially for those indicators that have shown little change over the past decade. In addition, a few indicators are higher in Montana than in the nation as a whole. Montana has higher rates for perforated appendix among adults and a rate similar to the national rate for children; these might be attributable in part to distance from and travel time to hospitals for rural residents. The prevalence of short term complications of diabetes for children is double the national rate, in contrast to good performance for Montana adults for the diabetes indicators. The rate of low birth weight in Montana is similar to the national rate.

Table 1. Comparison of Montana and National Adult and Childhood Prevention Quality Indicators

| Indicator   | Monta      | National, 2008 <sup>12</sup> |                |  |
|---|------------|------------------------------|----------------|--|
| Per 100,000 population age 18 years and older,          |            |                              |                |  |
| except as noted   | Crude Rate | 95% CI                       | Crude Rate     |  |
| Adult Indicators  |            |                              |                |  |
| Diabetes: short-term complications                      | 43.8       | 39.2, 48.8                   | 61.5           |  |
| Diabetes: long-term complications                       | 33.2       | 29.3, 37.6                   | 128.2          |  |
| Uncontrolled diabetes                                   | 7.0        | 5.3, 9.2                     | 23.0           |  |
| Lower extremity amputation due to diabetes              | 18.5       | 15.6, 21.9                   | 36.1           |  |
| Bacterial pneumonia                                     | 334.2      | 321.3, 347.5                 | 360.3          |  |
| Chronic obstructive pulmonary disease                   | 186.3      | 176.7, 196.3                 | 243.0          |  |
| Adult asthma  | 56.4       | 51.2, 62.0                   | 129.3          |  |
| Congestive heart failure                                | 243.7      | 223.9, 245.8                 | 398.5          |  |
| Angina without procedure                                | 13.9       | 11.4, 16.8                   | 24.9           |  |
| Hypertension  | 24.0       | 20.6, 27.7                   | 61.9           |  |
| Urinary tract infection                                 | 122.8      | 115.0, 130.9                 | 205.6          |  |
| Dehydration   | 87.7       | 81.1, 94.6                   | 110.9          |  |
| Low Birth Rate (per 100 live births)                    | 6.0        | 5.6, 6.5                     | 6.1            |  |
| Perforated appendix (per 100 appendix admissions)       | 35.7       | 31.0, 40.8                   | 28.2           |  |
|   |            |                              |                |  |
| Pediatric Indicators                                    | Montana,   | 2007-2009                    | National, 2008 |  |
| Asthma (ages 2 to 17 years)                             | 81.8       | 74.6, 89.4                   | 123.8          |  |
| Gastroenteritis (ages 1 to 17 years)                    | 34.4       | 29.9, 39.3                   | 105.3          |  |
| Diabetes: short term complications (ages 6 to 17 years) | 50.9       | 44.5, 58.1                   | 28.2           |  |
| Urinary tract infection (ages 1 to 17 years)            | 36.8       | 32.2, 41.9                   | 43.1           |  |
| Perforated appendix (per 100 appendix admissions)       | 29.2       | 25.3, 33.5                   | 28.7           |  |

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<sup>&</sup>lt;sup>10</sup> Preventable Hospitalizations. A Window Into Primary and Preventive Care, 2000. HCUP Fact Book No. 5. AHRQ Publication No. 04-0056, September 2004. Agency for Healthcare Research and Quality, Rockville, MD. <a href="https://www.ahrq.gov/data/hcup/factbk5/">https://www.ahrq.gov/data/hcup/factbk5/</a>

<sup>11</sup> Behavioral Risk Factor Surveillance System, http://apps.ndde.cdc.gov/brfss/

<sup>&</sup>lt;sup>12</sup> AHRQ Quality Indicator: Comparative Data for the PQI and PDI based on the 2008 Nationwide Inpatient Sample (NIS) Department of Health and Human Services Agency for Healthcare Research and Quality <a href="http://www.qualityindicators.ahrq.gov">http://www.qualityindicators.ahrq.gov</a> Version 4.1b (September, 2010).

Table 2: Adult PQIs And Pediatric PDIs for Montana Health Planning Regions, 2007-2009

|  | REGION 1<br>(EASTERN) |                    |                    | REGION 2<br>(NORTH CENTRAL) |                    | REGION 3<br>(SOUTH CENTRAL) |       | REGION 4<br>(SOUTHWEST) |                    | REGION 5<br>(NORTHWEST) |                    |                    | MONTANA |                    |                    |       |                    |                    |
|--|-----------------------|--------------------|--------------------|-----------------------------|--------------------|-----------------------------|-------|-------------------------|--------------------|-------------------------|--------------------|--------------------|---------|--------------------|--------------------|-------|--------------------|--------------------|
| Indicator                                | Rate                  | Lower<br>95%<br>CI | Upper<br>95%<br>CI | Rate                        | Lower<br>95%<br>CI | Upper<br>95%<br>CI          | Rate  | Lower<br>95%<br>CI      | Upper<br>95%<br>CI | Rate                    | Lower<br>95%<br>CI | Upper<br>95%<br>CI | Rate    | Lower<br>95%<br>CI | Upper<br>95%<br>CI | Rate  | Lower<br>95%<br>CI | Upper<br>95%<br>CI |
| Adult Indicators: (1)                    |                       |                    |                    |                             |                    |                             |       |                         |                    |                         |                    |                    |         |                    |                    |       |                    |                    |
| Short term complications of diabetes     | 43.9                  | 33.7               | 56.7               | 45.6                        | 38.3               | 54.0                        | 55.3  | 48.4                    | 62.9               | 33.3                    | 28.7               | 38.4               | 51.2    | 45.8               | 57.2               | 45.4  | 42.6               | 48.4               |
| Long term complications of diabetes      | 55.7                  | 45.6               | 68.0               | 58.9                        | 51.0               | 67.9                        | 30.3  | 25.8                    | 35.6               | 25.2                    | 21.2               | 29.7               | 25.0    | 21.5               | 29.0               | 33.6  | 31.3               | 36.1               |
| Uncontrolled diabetes                    |                       |                    |                    | 12.7                        | 9.1                | 17.5                        | 5.4   | 3.5                     | 8.0                | 5.8                     | 4.0                | 8.3                | 4.0     | 2.7                | 5.9                | 6.1   | 5.1                | 7.2                |
| Lower-extremity amputation               | 24.5                  | 18.0               | 33.3               | 21.4                        | 16.8               | 27.1                        | 18.0  | 14.5                    | 22.1               | 13.9                    | 11.1               | 17.4               | 16.2    | 13.5               | 19.5               | 17.5  | 15.9               | 19.3               |
| Chronic obstructive pulmonary disease    | 223.7                 | 204.6              | 244.7              | 147.8                       | 135.7              | 160.9                       | 190.5 | 178.8                   | 202.8              | 148.0                   | 138.4              | 158.1              | 147.8   | 139.2              | 156.8              | 163.9 | 158.9              | 169.0              |
| Asthma                                   | 46.1                  | 36.7               | 57.7               | 67.1                        | 58.6               | 76.8                        | 69.8  | 62.4                    | 78.0               | 53.8                    | 48.0               | 60.2               | 50.2    | 45.0               | 56.0               | 57.4  | 54.3               | 60.7               |
| Bacterial pneumonia                      | 500.6                 | 470.3              | 532.9              | 331.3                       | 312.6              | 350.9                       | 323.0 | 307.5                   | 339.2              | 280.0                   | 266.7              | 294.0              | 267.2   | 255.4              | 279.5              | 311.9 | 304.8              | 319.1              |
| Hypertension                             | 35.8                  | 28.0               | 45.7               | 25.2                        | 20.3               | 31.1                        | 14.4  | 11.2                    | 18.2               | 24.7                    | 20.8               | 29.2               | 24.9    | 21.3               | 28.9               | 23.7  | 21.8               | 25.8               |
| Congestive heart failure                 | 258.9                 | 238.6              | 281.2              | 231.7                       | 216.8              | 247.7                       | 254.5 | 241.1                   | 268.5              | 187.9                   | 177.0              | 199.3              | 202.5   | 192.4              | 213.1              | 219.1 | 213.3              | 225.0              |
| Angina without procedure                 | 36.0                  | 28.2               | 46.1               | 11.9                        | 8.5                | 16.5                        | 6.4   | 4.4                     | 9.1                | 12.4                    | 9.7                | 15.6               | 16.0    | 13.3               | 19.3               | 14.2  | 12.7               | 15.8               |
| Perforated appendix (2)                  | 32.1                  | 22.5               | 44.5               | 34.9                        | 27.8               | 43.2                        | 35.3  | 29.2                    | 42.3               | 28.9                    | 24.4               | 33.9               | 36.2    | 31.6               | 41.3               | 33.5  | 30.9               | 36.3               |
| Dehydration                              | 147.0                 | 130.0              | 166.1              | 115.6                       | 104.7              | 127.6                       | 106.6 | 97.7                    | 116.1              | 81.1                    | 74.0               | 88.8               | 79.2    | 72.8               | 86.1               | 95.9  | 92.0               | 99.9               |
| Urinary tract infection                  | 171.5                 | 153.0              | 192.2              | 134.3                       | 122.6              | 146.9                       | 119.8 | 110.2                   | 130.1              | 110.8                   | 102.4              | 119.8              | 112.9   | 105.3              | 121.1              | 121.4 | 117.0              | 126.0              |
| Low birth weight (3)                     | 6.4                   | 5.3                | 7.6                | 7.0                         | 6.3                | 7.8                         | 4.6   | 4.1                     | 5.2                | 7.2                     | 6.5                | 7.8                | 5.6     | 5.1                | 6.1                | 6.1   | 5.8                | 6.3                |
| Pediatric Indicators:                    |                       |                    |                    |                             |                    |                             |       |                         |                    |                         |                    |                    |         |                    |                    |       |                    |                    |
| Asthma (4)                               | 90.4                  | 65.9               | 120.9              | 127.9                       | 105.9              | 153.0                       | 65.4  | 52.1                    | 81.0               | 86.8                    | 72.1               | 103.6              | 62.6    | 51.4               | 75.5               | 81.8  | 74.6               | 89.4               |
| Gastroenteritis (5)                      | 41.7                  | 26.1               | 63.1               | 56.4                        | 42.6               | 73.3                        | 23.7  | 16.2                    | 33.4               | 29.4                    | 21.3               | 39.4               | 32.4    | 24.7               | 41.7               | 34.4  | 29.9               | 39.3               |
| Short term complications of diabetes (6) |                       |                    |                    | 52.8                        | 37.2               | 72.8                        | 33.6  | 23.0                    | 47.4               | 62.2                    | 48.1               | 79.1               | 57.6    | 45.4               | 72.1               | 50.9  | 44.5               | 58.1               |
| Urinary tract infection (5)              |                       |                    |                    | 35.3                        | 24.6               | 49.0                        | 30.3  | 21.8                    | 41.2               | 22.0                    | 15.2               | 30.9               | 28.1    | 21.0               | 36.8               | 28.6  | 24.6               | 33.1               |
| Perforated appendix (7)                  |                       |                    |                    | 32.3                        | 22.1               | 45.6                        | 32.4  | 22.4                    | 45.2               | 27.5                    | 20.4               | 36.4               | 27.3    | 21.2               | 34.6               | 29.2  | 25.3               | 33.5               |

<sup>(1)</sup> All adult rates except perforated appendix and low birth weight are age-adjusted to the 2000 standard population for adults age 18 years and older.

<sup>•</sup> Rate suppressed due to fewer than 20 events.



<sup>(2)</sup> Crude rate per 100 hospitalizations for appendicitis.

<sup>(3)</sup> Crude rate per 100 live births.

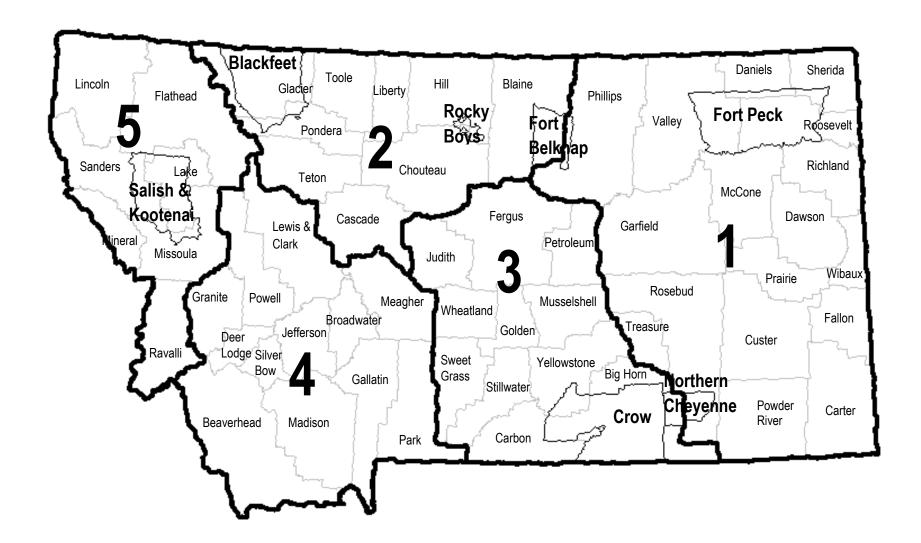
<sup>(4)</sup> Crude rate per 100,000 population age 2 to 17 years.

<sup>(5)</sup> Crude rate per 100,000 population age 1 to 17 years.

<sup>(6)</sup> Crude rate per 100,000 population age 6 to 17 years.

<sup>(7)</sup> Crude rate per 100 hospitalizations for appendicitis, ages 1 to 17 years.

Figure 6. Map of Montana Health Planning Regions



#### Regional Comparisons of Adult PQIs and Pediatric PDIs in Montana, 2007-2009

The 95% CIs associated with regional PQI and PDI admission rates in Montana are very wide, attributable to small numbers of events and small regional populations, even when looking at a three-year interval. This renders most apparent differences in admission rates among the counties non-significant. However, one pattern emerged from the regional comparisons.

Region 1, roughly the eastern third of the state, had statistically significantly higher admission rates for six of 13 adult PQIs; one adult PQI and three pediatric PDIs could not be computed for the Region 1 due to small numbers of events. The six PQIs which were significantly higher in Region 1 than elsewhere in Montana were admission rates for

- long-term complications of diabetes
- chronic obstructive pulmonary disease
- bacterial pneumonia
- angina without procedure
- dehydration
- · urinary tract infection

Region 1 is largely rural and remote. It has only one city with a population greater than 5,000. In addition, many of the smaller communities do not lie on major highways. Finally, there are only 56 physicians in the entire region who specialize in Family Medicine (34), Internal Medicine (17), Pediatrics (3), or General Practice (2), and 48 of them are concentrated in four towns throughout the region, Glasgow (16), Miles City (15), Glendive (9), and Sidney (8). Therefore access to primary and preventive care in Region 1 may be limited.

Montana Hospital Discharge Data System
Office of Epidemiology and Scientific Support
Montana Department of Public Health and Human Services

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